ON A MICROSCOPIC FUNGUS PARASITIC UPON THE CUCURBITACEÆ.

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Side by side with the disease which has been so destructive to the maize crops during the past three months, there has existed another disease, affecting, in an almost equally destructive manner, the Cucurbitaceæ; rock and water melons, and pumpkins alike being destroyed in large quantities by its ravages. Singularly, both diseases have traversed the same tract of country, from the near neighbourhood of Sydney northwards to the Tweed River, and westward, so far as I can learn, about forty miles from the coast.

The practice, so common amongst Australian farmers, of planting pumpkins between the rows of maize; and the fact, that both these and the maize have been attacked at the same time and in the same place, have given rise to the idea that the two diseases are identical. As a matter of fact, however, they are very different; the destruction of the maize being caused by the micro-fungus *Ustilago Candollei*, one of the class *Coniomycetes*; while that attacking the Cucurbitaceæ, is *Oidium monilioides* of the *Hyphomycetes*. Although, however, the causes are different, the results are similar; the destruction of the plant in both cases.

This fungus, *Oidium monilioides*, is supposed to be identical with that known as *Erysiphe graminis*; and the genus *Oidium* is now, by most mycologists amalgamated with *Erysiphe*. They differ in some respects, but the one *(Oidium)* is considered to be but a younger state of the other. The genus *Erysiphe* has no less than five different forms of fruit, the multiform threads bearing *conidia*, *asci* contained in sporangia, the larger *stylospores* produced in other sporangia, the smaller *stylospores* generated in

the pycnidia, and separate sporules which are sometimes found in the joints of the necklaces of the conidia. (1). *Oidium* has theoretically the same ; but really only produces two, conidia first and at a considerable time afterwards sporangia with spores.

Of the many plants of rock and water-melon and pumpkin that I have examined, I have found none past the first or conidia state. Indeed it is at this stage that the injury is done to the plant by the exceedingly dense mycelium, which not only robs the leaves of their moisture, but by forming a close mat over the underside of the leaf, completely seals up the stomata. If we pick out from a garden an apparently healthy plant, either of melon or pumpkin, but upon which the fungus has really commenced its work, we shall find that in this early stage, many of the leaves are marked on the underside with dirty white spots, and that their edges are beginning to curl inwards. In a day or two each spot will have increased in size, and the effect will also be visible on the upper surface of the leaf. At last the spots will have so much extended their borders as to have become confluent, and the leaf will be covered over its whole surface, by the mycelium of the fungus ; becoming dry and crisp and easily reduced to powder if crushed in the hand. Under the microscope, the appearance of this mycelium is that of a very beautiful interwoven mat, studded here and there with erect strings of conidia, resembling minute necklaces of pearls. At this stage, any fruit that may be upon the same branch is lost, although perhaps not larger than a small apple, by the decay of the fruit stalk. There being no transpiration from the dead leaves, any fluid that may still be passed upwards from the roots, appears to be thrown upon the fruit ; and this being surcharged, while the vitality of the plant is impared or almost destroyed ; decay begins, as in most other cases, at the articulations. The same thing occurs in other plants. If for instance, we give a fuchsia a great excess of water, *i. e.*, more than it can get rid of by transpiration, in a few days the leaves will become yellow and fall off if only lightly touched with the finger, breaking at the articulations, and carrying the petioles with them.

(1) Berkeley Introd., Crypt., Bot., p. 78.

As to any remedy, or means of destroying the fungus, when once in the plant, I know of none of any real value. As the mycelium of *Oidium* does not as a rule penetrate the leaf, but confines its destructive power to the surface, it would appear easy enough to get rid of it, and perhaps to a certain extent and in the case of a single plant or so in a garden, this may be done; but to the farmer, the value of a remedy would consist only in its being applicable to crops on a large scale. In many cases amongst our small farmers the loss of a crop, even of pumpkins, is severely felt, especially as at this time, when their chief product, the maize, has been destroyed also. I think, however, that in all cases of disease likely to attack field crops, immunity must be sought rather in preventive measures. More careful drainage, and irrigation where possible; especially avoiding the repeated planting of the same ground with the same crop; and generally endeavouring to ensure vigorous plants; for it may be considered almost an established fact, that fungoid diseases rarely attack strong healthy growing plants.

Dr. Carpenter in his "*Vegetable Physiology*," speaking of the spores of micro-fungi says: "It may be considered as certain, that an admixture of the spores of any of these fungi with the corn-grains will endanger the plants raised from them; but it is equally certain, that the fungi have little tendency to develope themselves in plants that are vegetating with perfect healthfulness." In another place speaking of *Peronospora infestans* (commonly known as the "potato disease") he says, "Just as the yeast plant will not vegetate, save in a fermentable fluid; so does it seem probable, on consideration of all the phenomena of the potato and vine diseases, that neither the *Peronospora* of the one, nor the *Oidium* of the other, will vegetate in perfectly healthy plants." Perhaps it would be well if our farmers in this colony, would take hold of the fact, that it is the opinion of the highest authorities and of practical farmers, both in Europe and America, that careful cultivation will produce plants of such vigour as may be almost considered proof against the attack of these fungoid parasites.